# HARBOR OF REFUGE SANDY BAY
# CAPE ANN
# MASSACHUSETTS

## SURVEY
## (REVIEW OF REPORTS)

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS. 02154

U. S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASS. 02154

ADDRESS REPLY TO:
DIVISION ENGINEER

REFER TO FILE NO. NEDED-R

29 September 1966

SUBJECT: Survey (Review of Reports) of Harbor of Refuge at Sandy Bay, Cape Ann, Massachusetts

TO: Chief of Engineers
ATTN: ENGCW-PD

1. Syllabus: The Division Engineer finds that the desired improvement of the Harbor of Refuge at Sandy Bay, Cape Ann, Massachusetts, by either completion of the breakwater superstructure on that part of the breakwater for which the substructure has been built or the removal of part of the substructure to eliminate hazards to small craft is not warranted at the present time. No necessity for changes to the present structure has been indicated which would justify the high cost involved. Therefore, it is recommended that no additional work be performed on the breakwater at this time.

2. Authority. - This report is submitted in compliance with Resolutions of the Committees on Public Works of the United States Senate and House of Representatives, adopted 20 May 1954 and 30 March 1955, respectively.

> "RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE UNITED STATES SENATE, That the Board of Engineers for Rivers and Harbors, created under Section 3 of the River and Harbor Act, approved June 13, 1902, be, and is hereby, requested to review the report of the Chief of Engineers on Sandy Bay (Cape Ann) Harbor, Massachusetts, published as House Document No. 453, Fifty-Sixth Congress, First Session, and other reports, with a view to determining whether any modification in the existing breakwater and adjacent harbors is advisable at this time".

"RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE HOUSE OF REPRESENTATIVES, UNITED STATES, That the Board of Engineers for Rivers and Harbors, be, and is hereby, requested to review the reports on Harbor of Refuge at Sandy Bay, Cape Ann, Massachusetts, submitted June 16, 1942, and other pertinent reports, with a view to determining if it is advisable to modify the existing project in any way at this time".

3. Purpose and Description: The purpose of this study is to determine the need for completion of the breakwater as planned under the existing project, or if this is found to be impracticable, to remove part of the substructure in the uncompleted sections.

4. Sandy Bay is a large indentation in the northeastern shore of Cape Ann at Rockport, Massachusetts. The bay is bounded by Straitsmouth Island on the east and Andrews Point on the northwest. It is about two miles wide between Andrews Point and Straitsmouth Island and about 1.5 miles long to its head at Rockport Harbor. By water, Sandy Bay is about 9 miles northeast of the entrance to Gloucester Harbor, 23 miles north of Boston Harbor, and 24 miles south of Portsmouth Harbor.

5. The rocky shores of Sandy Bay are indented by three small harbors, Rockport Harbor, Gull Cove (Granite Company), and Pigeon Cove. The largest of these harbors, Rockport, has an area of 15 acres. All are protected by stone breakwaters.

6. The prevailing winds are southwesterly during the summer and northerly during the winter. The bay is fully exposed to dangerous gales which blow from the northeast around to the east at all seasons of the year. The heavy seas accompanying these storms are broken to some extent by the sunken ledges called Avery Ledge, the Dry and Little Salvages, the Flat Ground, and Abner's Ledge, all located directly at the mouth of the bay.

7. The easterly entrance to the bay between Avery Ledge and Straitsmouth Island has a navigable channel about 30 feet deep at mean low water and the northerly entrance off Andrews Point a depth of 75 to 84 feet. The area available for anchorage is about 1,377 acres within the 24-foot contour. The bottom is

good holding ground with a depth of 45 to 84 feet at low water. Mean tide range in Sandy Bay is 8.8 feet, with a spring range of 10.0 feet.

8. The Town of Rockport, with a population of 4,616 in 1960, was famous for its granite quarries in the latter part of the 1800's, but today is best known as an art colony, fishing port, and summer resort. Good roads connect this area with other sections of Massachusetts.

9. Prior Reports: The Harbor of Refuge at Sandy Bay has been the subject of several previous reports. These are described in the following table.

| Published In | Nature and Date of Report | Work Considered And Recommendations |
|---|---|---|
| S. Ex. Doc. No. 74, 48th Cong., 1st Sess. | Survey Report 1883 | Basis for existing project, construction of national harbor of refuge, outlined advantages and disadvantages but no recommendation made. |
| H. Ex. Doc. No. 56, 48th Cong., 2d Sess. | Preliminary and Final Rpt 1884 | Harbor considered not necessary at this time. |
| S. Ex. Doc. No. 147, 49th Cong., 1st Sess. | Letter of Secretary of War 1886 | Recommended continuation and completion of the project. |
| H. Doc. No. 411, 64th Cong., 1st Sess. | Re-examination and Survey 1915 | Recommended abandonment of the project. |
| H. Committee on R&H Doc. No. 3, 65th Cong., 1st Sess. | Survey (Review of Reports) 1917 | To continue construction with modified section, recommended abandonment. |
| Unpublished | Survey (Review of Reports) 1938 | Recommended no further work beyond repairs to superstructure. |
| Unpublished | Survey (Review of Reports) 1941 | Recommended no additional work. |

10. Existing Corps of Engineers' Project: Both Sandy Bay and Rockport Harbor have been improved for the benefit of general navigation by the United States. Rockport Harbor has also been improved by the Commonwealth of Massachusetts.

11. Improvement of Rockport Harbor began in 1836 with the construction of a breakwater on each side of the harbor entrance. The existing project, adopted in 1902, and completed in 1905, provides for rebuilding the two breakwaters with rubblestone to a height of 18.5 feet above mean low water and removing the principal rocks in the harbor. Basins and channels have been dredged in the harbor to a depth of 12 feet, by the Commonwealth of Massachusetts. This work was done in 1914 and again in 1931.

12. The existing Federal project for Sandy Bay was adopted in 1884, and modified by enactments of 1900 and 1909. The original project provided for a breakwater consisting of a mound of rubblestone with top grade at 16.5 feet below mean low water, 25 to 33 feet wide at the top, to be surmounted by a masonry wall, 35 feet high. The wall would be 18 to 23.5 feet wide at the bottom, narrowing to 12 to 15 feet wide at the top. The breakwater would extend from Avery Ledge, 3600 feet to Abner's Ledge, thence 5,400 feet northwesterly in the direction of Andrews Point, inclosing an anchorage area of 1,377 acres at the 24-foot depth contour. The design of the breakwater was subsequently modified by departmental action to provide a rubblestone mound, with top grade at low water, about 80 feet wide at the top, surmounted by a sloped breakwater, faced with stone blocks laid flat in horizontal courses, with top grade at 22 feet above mean low water, and with bottom and top widths of 64 and 20 feet, respectively. The estimated cost of construction stated in the authorization document was $4,000,000, and as modified in 1909 was $6,905,000.

13. About 6,100 feet of breakwater substructure and 922 feet of superstructure have been built, leaving 2,900 linear feet of substructure on the western arm and 8,078 feet of superstructure remaining to be done. No work has been done on the project since 1916, at which time it was 26 percent complete. Since 1915, approximately 140 feet of the superstructure on the western arm has been destroyed. In 1917, recommendation was made to Congress that the project be abandoned (H. Doc. No. 411, 64th Congress, 1st Session, and Rivers and Harbors Committee Doc. No. 3, 65th Congress, 1st Session). No action was taken on the matter. The

total cost to the United States for the improvement of Sandy Bay under the existing project amounts to about $1, 925, 600 for new work and $15, 900 for maintenance, a total of $1, 941, 500.

14. A review of reports was authorized by a resolution of the Committee on Rivers and Harbors of the House of Representatives, adopted 12 February 1937. The improvement desired by local interests at that time was the completion of the breakwater as planned under the existing project, or, if this were found to be impracticable, restoration to the condition obtained when work was discontinued on the project in 1916. The report submitted on 21 December 1938, did not recommend completion of the breakwater or maintenance of the existing structure beyond the repair of 782 feet superstructure at such time as funds which were not required for more urgent work in the interest of commerce and navigation were available. A Review of Reports, authorized by a resolution adopted 28 July 1941 by the Committee on Rivers and Harbors of the House of Representatives, recommended no modification of previous reports. Neither of these reports were published. In 1952, it was estimated that an additional $9, 000, 000 would be required to complete the project with annual charges for interest, amortization and maintenance upon completion amounting to $600, 000. The Chief of Engineers recommended that the project be placed in an inactive status.

15. Desired Improvement: Local interests have stated that the partially erected breakwater is a hazard to navigation and should either be completed or removed. They claim that the increasing number of recreational craft in the area has emphasized the need for something to be done about the hazard. Some residents of the area claim that completion of the project would provide shore protection within Sandy Bay by reducing wave damage and erosion between Andrews Point and Gap Head.

16. Discussion: Sandy Bay, situated at the northeastern extremity of Cape Ann, lies fairly close to the lane of travel used by vessels operating along the New England coast. The location is exposed to gales from the north around to the east, partial protection from the quarter is offered by the uncompleted Federal breakwater. When construction was discontinued in 1916, the project was 26 percent completed. To complete the authorized project, as desired by local interests, would require an expenditure of nearly

$10,000,000 (1955 estimate). Removal of the existing substructure to an elevation sufficiently below mean low water to eliminate it as a navigational hazard would cost approximately $1,500,000 (1965 estimate).

17. When this project was designed as a harbor of refuge, there was a much greater need for such facilities than exists at present. The vessels plying the coast in the latter part of the 19th century consisted largely of four-masted sailing schooners, sloops and barges in tow. These vessels depended entirely upon favorable weather conditions, requring harbors of refuge spaced at intervals along the coast. By 1915, the number of these vessels had been reduced to approximately 50 percent of the total traffic, having been replaced by coastal steamers not requiring a harbor of refuge at Cape Ann. Today, these commercial sailing vessels have entirely disappeared from use. A few coastal steamers designed for rapid transportation now provide adequate shipping facilities to major ports along the coast. With the aid of present day weather broadcasts these vessels are capable of reaching safer natural harbors where better protection is afforded. On the coast between Boston and Portland, Salem, Gloucester, Newburyport, and Portsmouth Harbors are suitable as refuge for these craft.

18. The existing breakwater is awash at low water except for a distance of about 300 yards near the middle where it is above high water. About 400 yards of each end of the breakwater are covered at low water. A lighted buoy is located off the northeast end and a bell buoy marks the south end. These navigational aids are maintained by the U. S. Coast Guard. The breakwater outline is shown on U. S. Coast and Geodetic Survey Charts Nos. 243 and 1206.

19. Completion of the breakwater would provide limited benefits in the way of shore protection within Sandy Bay. The breakwater substructure is located between 1-1/2 to 2 miles offshore leaving considerable exposure to the north and east. Deep water waves generated by storms passing along the coast which approach the shore in this area from the north and northeast, would not be reduced by the breakwater. Harbors within the bay are protected by local breakwaters or natural shoreline configurations. The entire shoreline within the bay is rocky and steep with shoreline homes located above the 10-foot contour. No substantial storm damage to property has been reported in this area. Only minor wave damage to wharves has been noted in scattered locations.

20. Conclusions: The Division Engineer concludes that there is no satisfactory evidence to indicate that any present or prospective use of Sandy Bay, either commercially or as a harbor of refuge, would justify the large expenditure necessary to complete the project or to remove part of the substructure. The project was intended as a refuge for commercial sailing craft no longer in use. Modern shipping facilities provided by rail, truck and motor vessels have replaced this type of craft. These motor vessels are capable of operating under nearly all weather conditions and are further aided by improved weather forecasting, eliminating the need for such harbors along their route. It is considered that in its present condition, the breakwater properly marked by navigation aids, provides adequate protection for the nominal use which is made of the harbor as a refuge. Because of the remote location of the breakwater relative to the surrounding shoreline, completion of the structure would not provide a significant degree of protection to shorefront property in Sandy Bay.

21. Recommendation: In view of the absence of evidence that there has been any change in the conditions affecting Sandy Bay which would in any way alter previous report recommendations, the Division Engineer recommends that no additional work be performed on the breakwater at this time.

Incl
Map

REMI O. RENIER
Colonel, Corps of Engineers
Acting Division Engineer

CORPS OF ENGINEERS

U. S. ARMY

HALIBUT POINT

ANDREWS POINT

NO WORK HAS EVER BEEN DONE IN THIS SECTION

STA 90+00

STA 61+00

2900'

BREAKWATER

STA 36+00

BELL

FLAT GROUND

ABNERS LEDGE

922 FT OF SUPERSTRUCTURE COMPLETED IN 1916

PIGEON COVE

WHARF

ROCKPORT GRANITE CO

MITCHELL RK

SANDY BAY

BARTLETT RK

DODGE RK

BN

SANDY BAY LEDGE

Breakwater

ROCKPORT HARBOR

LT.

TWELVEFOOT RK

GAP HEAD

LT.

STRAITSMOUTH ISLAND

ROCKPORT

B&MRR

SANDY BAY YACHT CLUB PIER

WHALE COVE

FLAT PT.

LOBLOLLY COVE

OAR RK

EMERSON PT.

CAPE ANN

CAPE POND

ATLANTIC OCEAN

LITTLE SALVAGES

DRY SALVAGES

BN

HARBOR SIDE

OCEAN SIDE

APRON 10 TONS +

EXISTING SUBSTRUCTURE

EXISTING CROSS SECTION ADOPTED, IN 1909.

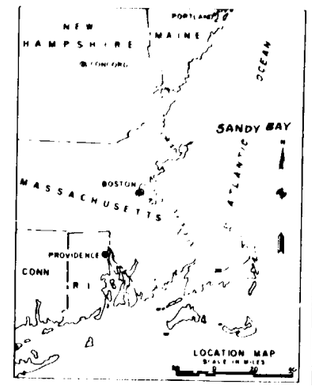
SCALE OF SECTIONS

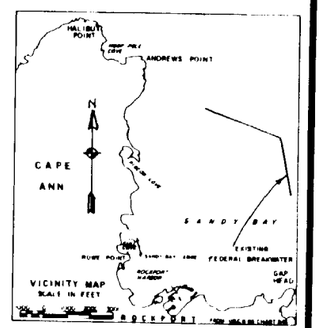
0 10 20 30 40 50 FT

**CONSIDERED IMPROVEMENT NOT RECOMMENDED**

COMPLETE BREAKWATER OR
REMOVE PART OF UNCOMPLETED SECTION

N




U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS, WALTHAM, MASS.

# SANDY BAY, MASS.
## HARBOR OF REFUGE

1000 0 1000 2000 3000 4000 5000FT

APPROVED: J.W. Leslie
CHIEF, ENGINEERING DIVISION

SUBMITTED: E.L. Hill
CHIEF, PLANNING AND REPORTS BRANCH

DR. BY:

F.W. Fogarty
CHIEF, RIVER AND HARBOR SECTION

TR. BY:

CH. BY:

Harwood A. Stuptill
PROJECT ENGINEER

TO ACCOMPANY
SURVEY REPORT
DATED: SEPT. 29, 1966

FILE NO. F-15
F-9-3

# HARBOR OF REFUGE AT SANDY BAY
# CAPE ANN, MASSACHUSETTS

Information Called for by Senate Resolution 148, 85th Congress
Adopted 28 January 1958

1. This study considered the need for additional work on the uncompleted breakwater which forms the harbor of refuge at Sandy Bay, Rockport, Massachusetts.

2. The improvement desired by local interests is the completion of the breakwater as planned under the existing project; or if this were found to be impracticable, that the substructure of the unfinished portion be reduced in height to eliminate the hazard of grounding by recreational craft cruising in the area during the boating season.

3. Construction was initiated in 1886 to establish a harbor of refuge for commercial sailing craft operating along the northern New England coast. These craft depended entirely upon favorable weather conditons, requiring refuge harbors spaced along their routes. Before the project could be completed this type of commercial vessel was replaced by steamers and more recently by motor vessels which do not require a harbor of this type on this coast. No work has been performed on the breakwater since 1916, at which time it was 26 percent complete.

4. The cost of completion of the project or the removal of part of the uncompleted structure would be excessive considering the nominal use now made of the harbor. Therefore, it is considered that no additional work should be performed on the project at this time. Maintenance of adequate navigational aids is the most reasonable and satisfactory means of providing for the safety of recreational craft navigating in the vicinity.

The Commonwealth of Massachusetts
Department of Public Works
Division of Waterways
100 Nashua Street, Boston 02114

July 27, 1966

Remi O. Renier, Colonel
U. S. Army, Corps of Engineers
New England Division
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Colonel Renier:

Reference: NEDED-R

This is a reply to your letter dated July 20, 1966 concerning the modification of the existing Federal project at Sandy Bay, Cape Ann, Massachusetts. Our engineers concur with the thinking of your staff that the expenditure of $10,000,000.00 or more to complete this project could not be justified at this time nor in the foreseeable future.

We have been carrying this project in our inactive file for sometime and are pleased to learn that the Corps plans no future expansion of this project.

Very truly yours,

JOHN T. HANNON
Deputy Chief Engineer

JTH/nc